REMARKS

Claims 1, 7, and 48-54 are pending. Claims 1, 7, and 48-54 are rejected under 35 U.S.C. § 112, second paragraph, for indefiniteness. Claims 1, 7, and 48-54 are rejected under 35 U.S.C. § 112, first paragraph, for lack of enablement. Claim 54 is rejected under 35 U.S.C. § 112, first paragraph, for lack of written description. By this reply, Applicant amends the specification, cancels claim 52, amends claims 1 and 7, and addresses each of the Office's rejections.

Support for the Amendments

The specification is amended to correct a clerical error.

Claims 1 and 7 are amended for reasons related to clarity. Support for the amendment to claim 7 is found in the specification, e.g., at page 16, lines 4-8. No new matter is added by these amendments.

Rejections under 35 U.S.C. § 112, second paragraph

The Office rejects claims 1, 7, and 54 under 35 U.S.C. § 112, second paragraph, for indefiniteness. The Office states "it is not clear whether 'thereof' [in claim 1] refers to 'diabetes,' the 'method' itself, the 'cell,' or some other element" (Office Action, p. 9). Claim 1 has been amended to recite "administering a cell prepared from human umbilical cord blood or placental blood to a patient in need thereof." Present claim 1 clearly indicates that the term "thereof" refers to the cell, which is administered to a patient for the treatment of diabetes. The rejection of claim 1 may now be withdrawn.

With regard to claim 7, the Office states:

> Claim 7 requires that the method comprise "administering said cell to effect regeneration or [sic: of] pancreatic islet cells" but it is not clear whether this regeneration actually occurs as part of the method or whether this limitation merely recites one possible intended use of the administration step…The question arises not because of the scope of the effect, but because the examiner cannot deduce whether this effect is an inherent effect of the method step in claim 1 (in which case claim 7 is redundant) or whether some additional, unrecited step or condition is required to produce the effect (in which case claim 7 is incomplete and must be amended to describe the essential step or condition necessary to yield the result).

(Office Action, p. 9.) Applicant has amended claim 7 to recite that the cell "effects regeneration of pancreatic islet cells." The cell can exert a treatment effect, e.g., by differentiating into a pancreatic islet cell (see, e.g., Phuc et al., *In Vitro Cell. Dev. Biol. - Animal* 47:54-63, 2011) or by modulating the immune system of the subject (see, e.g., Zhao et al., *Transl. Res.* 155:211-216, 2010 (Abstract only), Fiorina et al. (*Endocr. Rev.* 32:725-754, 2011 (Abstract only), and Haller et al. *Diabetes Care* 34:2567-2569, 2011 (Abstract only)). No further clarification regarding claim 7 should be required. The rejection of claim 7 may now be withdrawn.

Finally, the Office rejects claim 54, stating that "claim 54 appears to be an attempt to embrace all agents that are at some time in the future found to have the desired activity [of inducing the claimed cell to differentiate into a pancreatic islet cell *in vivo*]. The scope of these agents was unknown at the time of the invention and, therefore, indefinite" (Office Action, p. 10). Applicant respectfully traverses this rejection.

To the extent that the Office is implying that claim 54 is indefinite because of the scope of the claim, Applicant submits that this standard is incorrect. As noted in M.P.E.P. § 2173.04,

> Breadth of a claim is not to be equated with indefiniteness. *In re Miller*, 441 F.2d 689, 169 USPQ 597 (CCPA 1971). If the scope of the subject matter embraced by the claims is clear, and if applicants have not otherwise indicated that they intend the invention to be of a scope different from that defined in the claims, then the claims comply with 35 U.S.C. § 112, second paragraph.

Claim 54 clearly embraces an agent that induces a cell from human umbilical cord blood or placental blood to differentiate into a pancreatic islet cell *in vivo*. Agents that induce differentiation of stem cells into pancreatic islet cells were known at the time the present application was filed, and thus Applicant need not provide any further description of such agents in the claims or specification. In particular, Applicant's specification cites three publications available prior to the filing date of the present application that describe agents that were known to promote the differentiation of stem cells into cells expressing markers and hormones consistent with pancreatic islet cells (see, e.g., p. 11, line 26, through p. 12, line 1). These agents include glucose, HGF/scatter factor, activin-A, exendin-4, and nicotinamide. In addition, other agents known to induce formation of beta islet cells at the time the present application was filed

include bFGF, which is a beta-cell differentiation factor (see, e.g., Wong et al., *Exp. Diabetes Res.* 2011:406182, 2011; Hardikar et al., *Proc. Nat'l. Acad. Sci.* 100:7117-7122, 2003), the combination of bFGF and EGF (Lumelsky et al., *Science* 292:1389-1394, 2001), betacellulin alone or betacellulin in combination with activin-A (Demeterco et al., *J. Clin. Endocrinol. Metab.* 85:3892-3897, 2000), and gastrin (Wang et al., *J. Clin. Invest.* 92:1349-1356, 1993, and Wang et al., *Diabetologia* 40:887-893, 1997).

Moreover, the use of a functional limitation to define the claimed agent does not render claim 54 indefinite. The M.P.E.P., in section 2173.05(g), states:

> There is nothing inherently wrong with defining some part of an invention in functional terms. Functional language does not, in and of itself, render a claim improper. *In re Swinehart*, 439 F.2d 210, 169 USPQ 226 (CCPA 1971).
>
> A functional limitation must be evaluated and considered for what it fairly conveys to a person of ordinary skill in the pertinent art in the context in which it is used.

In addition, the Federal Circuit has stated that, if one skilled in the art would understand the bounds of the claim when read in light of the specification, then the claim satisfies 35 U.S.C. § 112, second paragraph. *Miles Labs., Inc. v. Shandon, Inc.*, 997 F.2d 870, 875, 27 USPQ2d 1123, 1126 (Fed. Cir. 1993).

Here, claim 54 sets clear boundaries on the patent protection sought by specifying that the agent is one that "induces said cell to differentiate into a pancreatic islet cell *in vivo*." In addition, in view of the publications cited in the present specification and available in the art at the time of the present invention, as is discussed above, the functional language in claim 54 describing the agent's activity fairly conveys to one of skill in the art the bounds of claim 54. Accordingly, the inclusion of functional language in claim 54 does not render this claim indefinite. This rejection should be withdrawn.

Rejections under 35 U.S.C. § 112, first paragraph

Enablement

The Office rejects claims 1, 7, and 48-54 for lack of enablement, stating that "the specification does not reasonably provide enablement for treating any diabetes by administering

the pluripotent cell described in claim 21 using any of the means recited in claim 52" (Office Action, p. 2). Applicant has cancelled claim 52. Thus, the rejection applied to prior claim 52 is now moot. Applicant respectfully traverses the rejection as applied to present claims 1, 7, 48-51, 53, and 54.

The Office states that "[t]reatment of diabetes by administration of UCB or placental blood stem cells was unpredictable at the time of the invention"(Office Action, p. 3), and thus "[a]t issue here is the degree of success the skilled artisan could reasonably have expected at the time of the invention in carrying out the claimed invention" (Office Action, p. 6). In particular, the Office cites Lewis et al. (*Blood* 97:3441-3449, 2001) and Haller et al. (*Exp. Hematol.* 36:710-715, 2008) as evidence that treatment of diabetes was considered unpredictable in the art.

Several post-filing publications show that the treatment of diabetes by administration of UCB or placental blood stem cells was not unpredictable at the time of the invention. Applicant directs the Office to Qujeq et al. (*Cell. Physiol. Biochem.* 28:323-328, 2011), Zhao et al. (*Transl. Res.* 155:211-216, 2010 (Abstract only)), Bhandari et al. (*Differentiation* 82:144-152, 2011 (Abstract only)), Ngoc et al. (*Human Cell* 24:86-95, 2011), Phuc et al. (*In Vitro Cell. Dev. Biol. – Animal* 47:54-63, 2011), Prabakar et al. (*Cell Transplant.*, 2011), Ende et al. (*Biochem. Biophys. Res. Commun.* 321:168-171, 2004 (Abstract only)), Ende et al. (*Biochem. Biophys. Res. Commun.* 325:665-669, 2004 (Abstract only)), and Yoshida et al. (*Stem Cells* 23:1409-1416, 2005), each of which provides data showing that the cell of present independent claim 1 and its dependent claims is capable of differentiating into insulin-secreting cells *in vitro* and *in vivo* and that administration of this cell promotes an improvement in treated diabetic subjects (see, e.g., Qujeq et al. and Phuc et al.). In particular, Phuc et al. shows that CD13+, CD14-, CD34-, CD45- UCB cells can be induced to differentiate into insulin-secreting cells (pp. 55-56) and that transplantation of these cells into streptozotocin (STZ)-induced diabetic mice results in a decrease in blood sugar level relative to control mice. These publications clearly demonstrate that human umbilical cord blood cells can be successfully administered to treat diabetes in a subject in need thereof, and thus support the enablement of present claims 1, 7, 48-51, 53, and 54.

The Office, citing M.P.E.P. § 2164.05(a) and *Ariad Pharmaceuticals Co. v. Eli Lilly & Co.* (CITE), states that "[A] later dated publication cannot supplement an insufficient disclosure in a prior dated application to make it enabling" (Office Action, p. 6). Applicant here does not rely on the cited post-filing publications to supply information that would have enabled the method of present claims 1, 7, 48-51, 53, and 54 had it been included with the application, as filed. Rather, Applicant submits the cited post-filing publications as evidence that Applicant's specification was fully enabled at the time it was filed. Post-filing publications may be relied upon to show that persons of skill in the art could have practiced the invention as of the application filing date without undue experimentation (*Amgen Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1336 (Fed. Cir. 2003), *reh'g denied*, 2003 U.S. App. LEXIS 5401 (Fed. Cir. 2003)). In addition, as is clear from M.P.E.P. 2164.02, "[c]ompliance with the enablement requirement of 35 U.S.C. 112, first paragraph, does not turn on whether an example is disclosed...An applicant need not have actually reduced the invention to practice prior to filing." The post-filing publications submitted in this case clearly show that the methods disclosed in the present specification could have been used to successfully practice the invention of present claims 1, 7, 48-51, 53, and 54 without undue experimentation at the time the application was filed. Thus, Applicant respectfully requests that the enablement rejection of claims 1, 7, 48-51, 53, and 54 be withdrawn.

Written Description

The Office also rejects claim 54 for lack of written description, stating that "[t]here is insufficient disclosure to demonstrate that applicants possessed even one such agent[that induces said cell to differentiate into a pancreatic islet cell *in vivo*], much less all agents with the required function" (Office Action, p. 7). Applicant respectfully traverses this rejection.

M.P.E.P. § 2163.02 states that "[a]n objective standard for determining compliance with the written description requirement is, 'does the description clearly allow persons of ordinary skill in the art to recognize that he or she invented what is claimed.'" (citations omitted). Furthermore, M.P.E.P. § 2163 states:

> What is conventional or well known to one of ordinary skill in the art need not be disclosed in detail.... If a skilled artisan would have understood the inventor to be in possession of the claimed invention at the time of filing, even if every nuance of the claims is not explicitly described in the specification, the adequate description requirement is met. (citations omitted.)

Also, a single disclosed species may be sufficient to adequately support a genus:

> disclosure of a single method of adheringly applying one layer to another was sufficient to support a generic claim to "adheringly applying" because one skilled in the art reading the specification would understand that it is unimportant how the layers are adhered, so long as they are adhered. (M.P.E.P. § 2163; citations omitted).

Applicant has plainly met this standard.

As is discussed above, the specification cites three publications available prior to the filing date of the present application that describe agents that were known to promote the differentiation of stem cells into cells expressing markers and hormones consistent with pancreatic islet cells (see, e.g., p. 11, line 26, through p. 12, line 1). Consequently, contrary to the Office's conclusion, the present specification does demonstrate that several of the claimed agents were known in the art, and thus were in Applicant's possession, at the time the application was filed. Because "[a] patent need not teach, and preferably omits, what is well known in the art" (M.P.E.P. § 2164.01, citing *In re Buchner*, 929 F.2d 660, 661, 18 USPQ2d 1331, 1332 (Fed. Cir. 1991)), an applicant need not disclose every known agent, much less any agent, so long as "an applicant...convey[s] with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the invention" (M.P.E.P. 2163.03). Here, Applicant has clearly demonstrated that several agents that are capable of inducing stem cells to differentiate into pancreatic islet cells *in vivo* were known at the time the present application was filed. The rejection of claim 54 should be withdrawn.

CONCLUSION

Applicant submits that present claims 1, 7, 48-51, 53, and 54 are in condition for allowance, and such action is respectfully requested.

A petition to extend the period for replying for four (4) months, to and including January 27, 2012, is submitted herewith. Applicant authorizes the Office to deduct the fee required by 37 C.F.R. § 1.17(a) for the petition from Deposit Account No. 03-2095.

If there are any other charges or any credits, please apply them to Deposit Account No. 03-2095.

Respectfully submitted,

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